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ENVIRONMENTALLY SOUND MANAGEMENT OF TOXIC CHEMICALS

Report of the Secretary-General of the Conference

Introduction

1. In response to decision 2/17 of the Second session of the Preparatory Committee for the United Nations Conference on Environment and Development, two reports entitled "Environmentally sound management of toxic chemicals", and "Options for Agenda 21" for the Environmentally sound management of toxic chemicals respectively have been prepared. This paper outlines the issues faced in developing environmentally sound management of toxic chemicals, and the main international activities relevant to them. Proposals for new programmes to address the gaps identified in the paper are provided separately in the Report of the Secretary-General on "Options for Agenda 21" (A/CONF.151/PC/42/Add.8).

2. In most countries a considerable strengthening of national capabilities and capacities for chemicals control and risk management is needed. A prerequisite for environmentally sound management of toxic chemicals is a reliable assessment of health and environmental risk. International activities need to be strengthened to support adequately programmes for the risk management of chemicals in member states through the world.

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3. This paper first sets out the issues, gaps and activities at a strategic level, and then deals with specific components of the work. The first component is a subject of major importance, chemical risk assessment. Other subjects which need attention include information exchange, harmonization of labelling systems, prioritization of efforts for risk reduction, strengthening of industry's responsible care and product stewardship, and intensified education, training and public awareness. The paper also provides a brief discussion of trade and economic aspects of chemicals control, which highlights the importance of harmonization of control procedures to avoid barriers to trade. Accident prevention and emergency response procedures are also dealt with as these are necessary supplementary components even in well developed systems for the risk management of chemicals. Very valuable contributions for the preparation of this report were received from several organizations and institutions, including inter alia the United Nations Environment Programme, the World Health Organization, the Food and Agriculture Organization of the United Nations, the International labour Organisation, the Organization for Economic Co-operation and Development, the European Chemical Industry Council and the International council of Chemical Associations. Members of the Working Party on Toxic Chemicals also provided useful advice and assistance in the preparation of this report.

CHEMICAL SAFETY - THE STRATEGIC ISSUES

4. The use of chemicals and of chemical processes is essential as an element of the development process and in the promotion of human well-being. They are extensively used by all societies, irrespective of their stage of development. The benefits of chemicals are inestimable. However, they can have adverse effects on human health and harmful consequences for the environment. It is therefore extremely important that the properties of chemicals are sufficiently known, and that adequate precautionary measures are taken regarding their handling and use.

5. More than 11 million natural or synthetic chemicals have been identified so far. Less than one percent or some 100 000 chemicals are commercially available. A considerable number of new chemicals appear on the market every year. The overwhelming problem for the environmentally sound management of chemicals is that the risk of most chemicals has not been sufficiently assessed.

6. The current production volume of chemicals is more than 400 million metric tons annually. It has been estimated that some 1 500 chemicals cover about 95 per cent of this total production. Most of these chemicals have not been thoroughly tested and assessed as far as the risks are concerned. A study within OECD (Organization for Economic Co-operation and Development) has shown that for about one third of these high volume production chemicals there are significant gaps to fill before their potential risks can be satisfactorily assessed and for some 150 such chemicals there are few or no data available.

7. When the knowledge of potential risks of even high production chemicals is still limited there are reasons to believe that among the remaining 100 000 chemicals in practical use there are substances which could present considerable risks to health and environment.

8. It should be emphasized that relatively few chemicals are used because they are toxic. Normally, the toxicity is an adverse effect. However, for one group of chemicals, the pesticides, toxicity forms the basis for the use. The pesticides are deliberately applied because of their toxicity in order to damage and kill target organisms. But it is seldom or never possible to limit the effects to target organisms. Therefore, pesticides have often been in the centre of the debate on chemicals as a threat to health and the environment and in many countries special legislation has been promulgated on pesticides.

9. During the past 40 years and particularly in the 1970s and 1980s considerable contributions to increased chemical safety have been made by governments, industry and academia. However, a great deal remains to be done to extend environmentally sound management of toxic chemicals to every significant substance and use, to undo the mistakes of the past, to harness the carefully chosen use of chemicals to contribute towards a sustainable development process and an improved quality of life in each community across the globe. The following are some of the main challenges facing environmentally sound management and an indication of the magnitude of the problems:

(i) The scientific information needed for the sound yet cost-effective management of chemicals is in many respects still at an early stage of development, and adequate data to manage all but a limited number of chemicals are lacking. Furthermore, the scientific basis for the management of mixtures of chemicals and combinations of chemicals and physical and biological agents is lacking.

(ii) The complexity of chemical usage, and the consequences of past misuse, are such that even the best-placed countries have far to go in the development of comprehensive and fully integrated chemical safety measures.

(iii) The introduction of chemicals and of chemically-related industries poses a particular challenge to those newly industrialized countries which as yet lack the infrastructure and trained manpower for chemical safety.

(iv) Gross chemical contamination, with grave damage to human health and the environment, has continued in recent times in some of the world's most important industrial areas. These will require major investments and development of new techniques for their restoration.

(v) The importance of long-range transport of pollution, with effects which can extend even to the fundamental chemical and physical processes of the Earth's atmosphere and climate, is only now becoming understood.

10. Several international programmes dealing with management of chemicals have been established in order to assist countries to increase chemical safety. Within the United Nations system and elsewhere the following five major types of programmes could be identified:

1. Those dealing with one aspect of the management of chemicals, such as the assessment of carcinogenic risk by IARC (International Agency for Research on Cancer), and the development of recommendations by the United Nations Committee of Experts on the Transport of Dangerous Goods.

2. Those dealing with chemicals that are pollutants in environmental media or contaminants in consumer goods, including food, e.g. the development and promotion by the IMO (International Maritime Organization) of marine pollution control conventions, and the Codex Alimentarius Commission.

3. Those dealing with several aspects of management of specific chemicals or groups of chemicals, e.g. FAO Code of Conduct on the Distribution and Use of Pesticides.

4. Those dealing with many aspects of the management of the full range chemicals, the two main programmes at the international level being the cooperative venture of UNEP/ILO/WHO in the IPCS (International Programme on Chemical Safety) and the OECD Special Programme for the Control of Chemicals.

5. Those dealing with cross-cutting activities concerned with technical cooperation and information dissemination, e.g. the International Register of Potentially Toxic Chemicals (IRPTC) of UNEP, and the training activities of the United Nations Specialized Agencies.

CHEMICAL SAFETY - GAPS HINDERING ITS ACHIEVEMENT

11. The objective of chemical safety is the avoidance of any harm caused by chemicals to human health, and of impacts of chemicals on the environment, which endanger the survival of species, eco-systems and habitats, or adversely affect the quality of the environment.

12. Any mechanism for implementing chemical safety must include both assessment of chemical risks and the management of the risks.

13. Risk assessment of chemicals is a prerequisite for adequate risk management.

14. Risk management of chemicals includes the full range of activities required to prevent their intrinsic hazards, and to ensure their safe production, transportation, storage, use and ultimate disposal, so that health and the environment are protected. It involves not only chemical substances of man-made and natural origin, but also hazardous processes involving chemicals.

15. In general terms the major gaps hindering the achievement of satisfactory chemical safety are:

- deficiencies in assessing and predicting health and environmental risks and defining acceptable levels oi exposure;

- inadequate national prevention and management of health and environmental problems;

- lack of effective coordination of ongoing international and national activities;

- difficulties in identifying sources of information relevant to the function and its effective organization.

16. More specifically, the gaps particularly in developing countries, although not exclusive to them, include:

- inadequate capabilities to assess the potential toxicity of chemicals; lack of facilities to control the nature and purity of imported or domestically produced chemicals.

- extensive use of chemicals by inadequately informed or trained operatives in small scale enterprises, and similar problems of exposure arising in domestic households.

- a general lack of understanding of the health and environmental problems associated with toxic chemicals, chemical processes and usage of chemicals at all levels of society.

- shortcomings of scientific, technical and managerial knowledge concerning the technology transfer, storage, transportation, use or disposal of chemicals, and lack of resources to establish properly coordinated infrastructures, controls, and procedures.

- basic deficiencies in governmental administrative or scientific structures to properly advise on the control and use of chemicals coupled with inadequate internationally harmonized labelling of chemicals and user information.

- a general absence of regulations concerning chemicals.

- a scarcity of resources to deal properly with chemical safety.

- shortage of trained personnel, and a lack of research directed specifically to national or local problems.

- shortage of the resources and deficiencies in the knowledge required to substitute persistent or toxic chemicals by safe but effective alternatives.

OVERVIEW OF INTERNATIONAL ACTIVITIES TO PROMOTE CHEMICAL SAFETY

Activities dealing with one particular aspect of risk management of chemicals

17. Many organizations are involved in the development of recommendations, guidelines, codes of conduct and conventions for specific aspects of chemical risk management. Within the United Nations system, ILO's work is concerned with safe use of chemicals in the workplace. A series of conventions, recommendations and codes of practice concerning the management of specific chemicals in the workplace have been established. There is also an ILO Convention on safety in the use of chemicals at work and a code of practice on major hazard control. Currently, ILO, within the context of the IPCS, is considering the harmonization of classification systems for chemicals, and in which a number of related activities of other organizations, such as the United Nations Inland Transport Commission, the OECD and the CEC (Commission of the European Communities), are being taken into consideration.

18. UNEP is developing guidelines for management of specific aspects of chemical risks. A series of technical guidelines are being issued on environmentally sound management of specific industrial sectors, e.g. aluminium, iron and steel, motor vehicle, pulp and paper, etc., as well as of specific industrial operations, e.g. safe warehousing. UNEP has also issued guidelines on disposal of hazardous wastes, information exchange in relation to chemicals, and preparedness and response to chemical accidents through the APELL (The Awareness and Preparedness for Emergencies at Local level) process.

19. Guidance on chemical risk management during transportation is provided through the work of IMO, ICAO and, in particular, the Committee of Transport of Dangerous Goods of the United Nations Inland Transport Commission.

20. Other international organizations, groups of countries and non-governmental organizations issue guidelines and recommendations on specific aspects of risk management of chemicals. The CMEA has issued guidelines on worker protection and chemicals waste management.

21. The Nordic Council issues conventions on the work environment and guidelines on worker protection. Employers and workers organizations develop guidelines for worker protection.

22. Multilateral development assistance agencies, through the CIDIE (The Committee of International Development Institute for Environment) provide guidance on chemical safety in the context of developing environmentally-sound investment projects.

Activities dealing with management of chemicals that are pollutants in the environment media or contaminants in consumer goods, including food

23. Many United Nations organizations and specialized agencies are involved in risk management of chemicals as they appear as pollutants in the environment. The United Nations Economic and Social Commissions issue guidelines and develop conventions on control of air and water pollution, in particular through the work of the UN/ECE Senior Advisors on the Environment and the UN/ECE Working Party 29 on the Construction of Motor Vehicles. UNEP prepares international instruments on chemical contamination of the environment, such as the Montreal Protocol on substances that deplete the ozone layer and the Basel Convention on the control of transboundary movements of hazardous wastes and their disposal. IMO prepares conventions related to pollution of the sea, particularly concerning oil pollution and ocean dumping of chemicals. WHO uses the chemical risk assessments prepared by the IPCS in the development of guidelines for air quality and drinking water. The World Bank has developed with UNEP and WHO guidance on safe disposal of hazardous waste.

24. FAO and WHO provide the scientific evaluations to the Codex Alimentarius which form the basis for guidance on safe levels of chemicals as additions, contaminants, and pesticide and veterinary drug residues in food.

Activities dealing with several aspects of management of particular groups of chemicals

25. Within the United Nations system, there is one activity dealing with the full range of risk management activities, including technical cooperation, information dissemination and training, for a particular group of chemicals, namely the FAO work on the Code of Conduct on the Distribution and Use of Pesticides. Also in this category is the joint work of FAO and UNEP on integrated pest management.

Activities dealing with many aspects of the management of the full range of chemicals

26. The ILO, UNEP, WHO International Programme on Chemical Safety (IPCS) was established to provide a comprehensive programme to assist in risk management of the full range of chemicals, which is done either through the Central Unit of the IPCS or through the individual programmes of the three cooperating organizations. The IPCS Risk Assessment work includes the elaboration of Environmental Health Criteria documents devoted to evaluation of chemicals and groups of chemicals and monographs on methodology. Risk management activities are concerned with chemicals emergency preparedness and response, prevention and treatment of poisoning, technical cooperation and human resource development, including training and the preparation of guidance materials.

27. The Special Programme of the OECD for the control of chemicals is the other comprehensive intergovernmental activity dealing with many aspects of the risk management of the full range of chemicals. This Programme is concerned with both new and existing man-made chemicals, which are used in trade and commerce. Most of the OECD activities are concerned with risk assessment, including guidelines for testing of chemicals and principles for good laboratory practice (GLP). The risk management activities are concerned with risk reduction and the development of council decisions and acts concerning collective actions on specific chemicals such as for the notification of new chemicals, and on compliance with GLP. OECD also issues guidelines e.g. on chemical accident prevention and control. Work is also undertaken on cost assessment of various risk management actions.

28. The European Economic Community (EEC) also has its own activities on hazardous chemicals covering a wide range, including directives and legal instruments, guidelines and codes of practice, training, information, dissemination and institution building.

29. Industry through the International Council of Chemical Associations (ICCA) has adopted the principles of "Responsible Care" and "Product Stewardship" which promotes environmentally sound risk management of chemicals used throughout industry.

Cross-cutting activities

30. In the management of chemicals several organizations are involved in cross- cutting activities, particularly technical cooperation and information dissemination. ILO, UNEP, WHO (particularly through its regional offices) FAO, UNIDO and IMO have active technical cooperation programmes related to chemical safety; many of which are supported with financial assistance from UNDP and the development assistance agencies.

31. Information dissemination on aspects of chemical safety is the specific role of several programmes within the United Nations system, in particular: the CIS programme of ILO, three programmes of UNEP namely the IRPTC (concerned with chemical information), the INFOTERRA (providing information on environmentally related matters) and the IEO (concerned with information related to industry and environment); finally there are the UNIDO activities on information relating to environmentally sound management of industrial sectors.

RISK ASSESSMENT

The Nature and Objectives of Risk Assessment

32. Risk is a statistical concept and was defined by the Preparatory Committee of the 1972 United Nations Conference on the Human Environment as the expected frequency of undesirable effects arising from exposure to a pollutant. Estimates of risk may be expressed in absolute terms or in relative

terms. The absolute risk is the excess risk due to exposure. The relative risk is the ratio between the risk in the exposed population and the risk in the unexposed population.

33. Scientific assessment of the risk to human health and the environment from exposure to chemical substances, mixtures of chemicals or combinations of chemicals and physical and biological agents is the basis for environmentally sound management of toxic chemicals.

34. A risk assessment comprises (i) identifying the inherent capacity of the chemical to cause undesirable effects, (ii) estimating the relationship between dose, or level of exposure, and the incidence and/or severity of an effect, (iii) estimating the dose, or level of a chemical in the environment, to which various populations or ecosystems are actually exposed, and (iv) estimating the incidence and severity of the adverse effects which are liable to occur in a population or ecosystem due to the dose-response and exposure assessment.

35. Risk assessment requires the evaluation of all available data, although it may either be comprehensive or focus on a particular aspect of risk. A careful appraisal of the quality of the data and a peer review of crucial evidence are essential. The final evaluation should be made collaboratively by a group of well qualified experts in the relevant disciplines and should be published.

The Issues

36. Despite extensive activities in several countries, as well as by the international programmes, relatively few chemicals in common use have been assessed. One of the obstacles to timely risk assessment is lack of adequate data, and in particular of openly available data, even for many of the high volume production chemicals. As adequate data is produced on far more chemicals as a result of the current programmes of OECD, the CEC and others, it will be essential to considerably strengthen the mechanisms for risk assessment. Only if the expertise and resources available throughout member states and international organizations can be well coordinated in a coherent programme will this challenge be met.

37. A considerable amount of the background work for international assessments is carried out on a voluntary basis by a few member states. The organization of this is very time consuming. Since projects are sometimes selected according to the expertise available at the time, there is great difficulty in planning assessment programmes according to rational priorities.

38. Assessments by international organizations are intended to be adaptable to the needs of all states. While their technical quality is highly respected, they are not relied on by member states for a number of reasons which include:

- assessments are not undertaken or updated quickly enough to meet urgent national needs,

- assessments may not address particular features of a national problem,

- states may lack the exposure data needed to apply the guidance given.

At the same time national assessments are often unavailable for wider use and are therefore a non-cost-effective use of the resources put into them.

39. There is a remarkable shortage of adequate exposure data even in highly industrialized countries. Resources in analytical chemistry are not as cost-effectively deployed as they should be.

40. The methods at present available for toxicological testing and environmental epidemiology have many limitations and research and methodological development requires the maximum practicable impetus. Harmonization of methods and enhancement of the validity and comparability of results are highly desirable.

Current Activities

41. At the international level some of the most important activities for risk evaluation are performed by IARC and IPCS.

42. IARC elaborates and publishes Monographs on the evaluation of carcinogenic risks to humans. So far about 500 chemicals have been evaluated for carcinogenicity. In addition to the Monographs Programme, IARC develops and validates methods for the assessment of chemical carcinogenicity, runs carcinogenicity testing of chemicals through an international network of laboratories, performs epidemiological studies on the role of chemicals in the etiology of human cancer, and studies mechanisms of chemical carcinogenicity.

43. IPCS is responsible for the Environmental Health Criteria Programme which covers all forms of toxicity and issues of methodology. So far about 100 chemicals or groups of chemicals have been dealt with. Currently about 15 chemicals or groups of chemicals are being evaluated each year, with a medium term goal of 50 evaluations. The comprehensive evaluations are published in booklets (EHCs), varying from some 25 pages to more than 400 pages. A detailed data profile and legal file regarding every evaluated chemical can be obtained from IRPTC.

44. Among the objectives for IPCS is also to promote the development, improvement, validation and use of methods for laboratory testing and ecological and epidemiological studies and other methods suitable for the evaluation of health and environmental risks and hazards from chemicals. This important methodological part of the risk evaluation process has been explored by the means of working parties, meetings, collaborative studies etc. resulting in 13 volumes in the EHC series and an additional number of books often published jointly with other bodies like IARC, SCOPE, CEC etc.

45. Risk assessments are undertaken by other bodies for more specific purposes. In the mid fifties a still ongoing cooperation between FAO and WHO

started for evaluation of food additives (JECFA- Joint FAO/WHO Committee on Food Additives). A similar work has been in progress regarding pesticide residues since the early sixties (JMPR-Joint FAO/WHO Meeting on Pesticide Residues). Within the framework of these activities some 700 food additives and more than 200 pesticides have been evaluated. During the last few years the activity has been expanded to comprise also toxicological evaluation of certain veterinary drug residues in food. Both JECFA and JMPR serve as advisory organs to the Codex Alimentarius Commission in its work to harmonize food standards.

46. Examples of other risk evaluation for specific purposes include water quality guideline limits for surface water (UNEP/WHO), air quality (ambient or indoor) gases, vapours, fibres, particulate matter (UNEP/WHO), occupational health limits for pesticides and agrochemicals (ILO/FAO/WHO).

47. Substantial programmes of risk assessment are also undertaken at the national level. Some industrialized countries have a range of institutions responsible for assessments relating to the different environmental and commercial sectors.

48. In order to facilitate the use of national reviews internationally the OECD has adopted guidelines for preparing national reviews. The guidelines comprise a detailed list of data elements for possible inclusion in a chemicals review, presented under the following headings: Chemical identity, Physical and chemical properties, Analytical methodology, Exposure data, Effects on human beings, Effects on the environment, Other pertinent data. The guidelines have been harmonized with the recommended format for the Environment Health Criteria (EHC) documents of IPCS.

PRIORITY-SETTING OF CHEMICALS FOR EVALUATION

The issues

49. The discrepancy between the great number of existing chemicals with few or no toxicology data and the scarcity of resources available for their investigation and assessment, highlights the need for careful priority-setting for testing and evaluation. The World Commission on Environment and Development recommended that major chemical-producing countries, amongst others, should "reinforce on-going efforts to obtain international agreement on the selection of existing chemicals for priority testing, on criteria and procedures for their assessment and on a system for international sharing of the tasks and the resources required".

Current activities

50. The most comprehensive evaluation of chemicals is carried out by UNEP, ILO and WHO under the umbrella of IPCS. The selection of chemicals for evaluation has resulted in lists which are continuously updated. Three main selection processes have taken place in 1980, 1984 and 1987.

51. The main criteria for selection are the following:

(i) The chemical represents a hazard for human health and/or the environment;

(ii) The possible use, persistence, accumulation, or degradation of the chemical shows that there may be significant exposure of people or the environment;

(iii) The size and nature of the population at risk, both humans and other species, and the risks for the environment are taken into account;

(iv) The chemical should be of major interest to several countries.

52. The selection procedure in 1987 could also benefit from the results of the comprehensive screening procedures for priority setting carried out in Germany and USA. There was a good conformity between the results of these procedures in which account had been taken of toxicity, frequency of occurrence as pollutants and potential for human exposure to the chemicals.

INFORMATION EXCHANGE ON TOXIC CHEMICALS PIC STRENGTHENED AND EXPANDED

The Issues

53. Many countries do not at present have the mechanisms and infrastructures to regulate the formulation, use, storage and disposal of chemicals. Particular concern has been expressed over the use in such countries of chemicals which have been banned or severely restricted elsewhere, for health or environmental reasons. Some receive little or no technical assistance and others must rely excessively on the chemical industry to promote safe and proper distribution and use practices.

54. Regulating the export of chemicals from producing countries rather than the import or use in receiving countries is a possible solution. However, a ban in an exporting country is not necessarily a valid reason for prohibiting the export of that product to other countries.

55. In any case it may be that governments of importing countries must judge the need for control if it is to be truly effective. Developing countries are mostly in tropical or semi-tropical regions. Their economic and environmental conditions and, therefore, their particular problems are different from those of the countries in which chemicals are traditionally manufactured. Only they can weigh the advantages and disadvantages of the use of the chemical under the conditions in their country. Such a judgement should be made by the responsible authority in the importing country, but that authority should be provided by the exporting country with all relevant information.

Current activities

56. In addressing this issue, both FAO and UNEP have recently introduced provisions for Prior Informed Consent (PIC), to strengthen the existing Code of Conduct on the Distribution and Use of Pesticides and in the London Guidelines for the Exchange of Information on Chemicals in International Trade, respectively. Since then, a FAO/UNEP joint programme has been launched on the operation of the PIC procedures for chemicals which have been banned or severely restricted for health or environmental reasons in one or more countries.

57. The existing International Code of Conduct specifies the joint responsibilities of all parties engaged in pesticide distribution and use. The London Guidelines, provide for comprehensive information exchange on all chemicals, including pesticides. PIC is intended to assist importing countries, which at present lack effective regulatory programmes while, they are helped to develop or strengthen such programmes.

58. The objective of the FAO/UNEP joint programme is to provide operational assistance, training and technical advice to importing countries on the procedures for implementing their decisions on whether to receive future shipments of chemicals that have been banned or severely restricted, elsewhere.

59. Main elements include:

- Establishment and maintenance of a network of Designated National Authorities to perform the functions related to the exchange of information and decisions. By 1 March 1991, 90 countries had appointed authorities.

- Establishment and operation of a joint database and information exchange system on chemicals included in the PIC procedure. The database is already functional, but it needs to be completed through updating of information from Member countries on relevant inventories of compounds which have been banned or severely restricted for health or environmental reasons.

- Decision Guidance Documents and technical assistance to provide the information needed for decisions in participating importing countries.

- Technical advice is provided by a joint FAO/UNEP Panel of Experts on PIC.

Major responsibilities of the Panel include:

(i) the selection of chemicals justifying inclusion in PIC;

(ii) review and clearance of guidance documents;

- Monitoring and review of the implementation of PIC procedures by governments, based, inter alia, on periodic reporting by the designated authorities.

60. Other international organizations now also active in the area are as follows:

- The Working Group on the Export of Domestically Prohibited Goods and Other Hazardous Substances within GATT are at the final stages of submitting to their Contracting Parties a proposal, stating that any Contracting Party adopting measures to ban or severely restrict a chemical in its domestic market, should examine whether the measure should also apply for export of the chemicals. If the ban or severe restriction is decided not to apply for export, the Contracting Party shall promptly notify the GATT Secretariat which, then, distributes the information to all Contracting Parties. The GATT proposal applies in practice only to Contracting Parties not participating in the Information Exchange and PIC procedures, encourages Contracting Parties to accept and apply the London Guidelines and the Code of Conduct along with other international instruments relating to pharmaceuticals, hazardous wastes, consumer products and the environment.

- According to Article 29 of the ILO Chemicals Convention, exporting States shall communicate to importing countries information on chemicals which are banned for some or all uses in the exporting country. Efforts are being made to link ILO's work in this field with the global PIC procedure.

61. OECD Member countries have concluded that, in the light of the PIC Programme, OECD would take no further action with respect to the 1984 OECD Recommendation concerning Information Exchange related to Export on Banned or Severely Restricted Chemicals and would, instead, implement the joint Scheme. In this regard, OECD is sponsoring a training workshop on PIC, in co-operation with FAO/UNEP, scheduled for September 1991.

HARMONIZATION OF CLASSIFICATION AND LABELLING OF CHEMICALS

The Issue

62. The practical management of chemical risks calls for chemicals to be labelled. The information put on the label is determined inter-alia by the use of the chemical and the hazard.. Classification of chemicals by risk or hazard provides a valuable tool for managing chemical risks e.g. in protecting the consumer, the worker, or the environment. A unified system of classification and labelling would enhance the environmentally-sound management of chemicals throughout their life span in manufacture, transport, storage, use and disposal. There is need for a sound scientific basis for developing such a verified system of classification.

63. There would be enormous advantages in a harmonized international system for classification and labelling of chemicals. Trade in chemicals would benefit from a system designed to provide chemical shipments with internationally recognized comprehensive hazard data in the form of labels and chemical safety data sheets covering all aspects of safe transport, use and disposal.

64. Standardized hazard communication terminology and symbols would make it much easier to translate the necessary information to the end user's language. The importance of world-wide understandable pictograms should be underlined. A standardized system would also facilitate training in the area of chemical safety, particularly in developing countries.

65. In addition, a world-wide harmonized classification and labelling system would considerably reduce the costs of acquiring, organizing and disseminating knowledge related to hazardous properties of chemicals and the technical means to control them. One harmonized system would also significantly reduce the use of animals for testing purposes.

Current Activities

66. Two parallel international activities introduced in the 1950s resulted in the two most comprehensive current systems for classification and labelling of chemicals. One is laid down in the United Nations Recommendations on the Transport of Dangerous Goods ("The Orange Book"), first published in 1957 (Sixth revised edition, published in 1989). According to actions by the United Nations ECE, IMO and ICAO these recommendations apply to inland transport by road in Europe, and to transport by sea and air. Also the much older rules for transport by rail have been revised taking the United Nations Recommendations into account. The other system originating from the Council of Europe (The "Yellow books", first published in 1962, fourth revised edition in 1978 with later supplements), adopted in 1967 by the Council of the European Communities, is compulsory for the twelve Member states of EC and has been accepted in a modified form in several countries outside the EC.

67. Initiatives in ILO and in particular the Chemicals Industries Committee of ILO have influenced both systems. However, there is a fundamental difference between the two systems. The United Nations Recommendations on the Transport of Dangerous Goods is a classification system covering only acute hazards arising from accidents during transport. The European system takes into account a number of different hazards and aims at the protection of workers and consumers in a first priority.

68. In addition to the two systems mentioned, other ways of categorizing hazardous chemicals exist. Examples are ways of indicating carcinogenic risks, used by IARC, and WHO recommendations for classifying pesticides. Moreover, several different national systems are in operation.

69. Recently, ILO has taken an important initiative in the frame-work of the implementation of the ILO Convention concerning Safety in the Use of Chemicals

at Work. Within the content of the IPCS, the ILO is making an assessment of the size of the task of harmonizing existing international, national and regional criteria and classification systems established for the use of chemicals at work. By 1993 it is expected to establish a proposed list of hazard categories and to address the task of harmonizing classification criteria. Work on a common labelling system would follow.

RISK REDUCTION INCLUDING ENVIRONMENTALLY SOUND PEST MANAGEMENT

The Issue

70. The environmentally sound management of chemicals can be assisted by the substitution of hazardous substances by less harmful ones for particular uses, e.g. the replacement of a pesticide, which is highly toxic to humans or is persistent in the environment, by another which is less toxic or persistent, but which is as effective in its intended use. Alternatively, risk may be reduced by the more restricted use of a toxic chemical for a particular purpose in combination with other methods of pest control. The issue is to find suitable substitutes, ensuring that thorough health and environmental risk assessments have been carried out. A further issue for management is to ensure that the phasing out and adequate control of the old substance and its replacement by the new chemical in a cost-effective manner.

Current Activities

71. Already in 1952 the International Labour Conference adopted a Resolution on the principle of substitution of harmless or less harmful substances for harmful ones. This principle has later been reiterated in several ILO Conventions in the chemical safety field. More recently and in a broader context the principle has formed the basis for what is now known as risk reduction.

72. In the Bergen Ministerial Declaration on Sustainable Development in the ECE Region Ministers agreed, inter alia, to encourage in industry and in society approaches which address all phases of the life cycle of a product with the objective of minimization of short and long-term risks to human health and the environment.

73. The concept of risk reduction of existing chemicals was the subject of a Decision-Recommendation by the OECD Council in January 1991. The Council decided that OECD Member countries should establish or strengthen national programmes aimed at the reduction of risks from existing chemicals to the environment and/or the health of the general public or workers. Among other things the Council recommended that, where appropriate, member countries should undertake concerted activities to reduce the risks of selected chemicals, taking into account the entire life cycle. These activities could encompass both regulatory and non- regulatory measures including: the

promotion of the use of cleaner products and technologies; emission inventories; product labelling; use limitations; economic incentives; and the phase-out or banning of particular uses of chemicals where necessary.

74. In the agricultural area the growing concern worldwide about the side effects of agricultural pesticides on human health and the environment has reinforced the integrated pest management (IPM) concept defined by a FAO Expert Panel in 1967 as "a pest management system that, in the context of the associated environment and the population dynamics of the pest species, utilizes all suitable techniques and methods in as compatible a manner as possible and maintain the pest population at levels below those causing economic injury". There are several ways by which FAO promotes IPM as a very important component of its overall strategy to develop sustainable agricultural systems. A joint FAO/UNEP Panel of Experts advises on policies and programmes with regard to IPM. Through publications, participation and sponsoring of workshops, symposia, expert consultations and many training activities, the knowledge and practice of IPM to disseminate to Member Nations. Research and development projects are being executed in developing countries to bring the practice of IPM within the reach of growers of food and fibre crops. Technical cooperation programmes exist to assist countries to implement the International Code of Conduct on Distribution for all pesticides, including IPM.

RESPONSIBLE CARE AND PRODUCT STEWARDSHIP

The Issue

75. The practical implementation of the environmentally sound management of chemicals is largely the role of industry and commerce which has the primary responsibility for good practice in the manufacture, transport, storage, use and disposal of chemical. Governments need to establish the legislative and advisory framework in which industry and commerce may operate in an environmentally sound manner. The concepts of "responsible care" and "product stewardship" have been evolved, guidelines developed by industry in order that it may fulfil its responsibilities for the sound management of chemicals.

Current Activities

76. The recently established International Council of Chemical Associations has introduced initiatives regarding Responsible Care and Product Stewardship. The initiative began in Canada in 1985, and has since been introduced in many other countries.

77. Under the Responsible Care initiative, chemical companies are committed, in all aspects of safety, health and protection of the environment, to seek continuous improvement in performance, to educate all staff, and to work with customers and communities regarding product use and overall operation. The commitment is described in a set of Guiding Principles.

78. The detailed implementation of the Responsible Care initiative by national chemical industry associations will vary according to national cultures and circumstances. Nevertheless, all programmes will need to address certain fundamental features which include:

(i) A formal commitment to a set of guiding principles on behalf of each company.

(ii) A series of Codes, Guidance Notes and Checklists to assist companies to implement the commitment.

(iii) The progressive development of Indicators against which improvements in performance can be measured.

(iv) An ongoing process of communication on health, safety and environmental matters with interested parties outside the industry.

(v) Provision of fora in which companies can share views and exchange experiences on implementation of the commitment.

(vi) Adoption of a title and a logo which clearly identify national programs as being consistent with and part of the concept of Responsible Care.

(vii) Consideration of how best to encourage all Association member companies to commit to and participate in Responsible Care.

79. Companies not only make a commitment to a set of guiding principles on health, safety and the environment, but also work with their association to develop guidance on how to implement the principles. Companies measure results in implementing the initiative and report to their association for an association-wide analysis of performance, and for public reporting. Through the initiative, companies begin a dialogue with the public on the public's concerns about the chemical industry. Companies share their experiences to help other companies implement the initiative. To get the greatest improvement, associations are making adherence to the initiative a condition of membership and are making every effort to gain full membership participation.

80. Product Stewardship is a process for the responsible and ethical management of the health, safety and environmental aspects of a product from its invention through to its ultimate use and beyond. Product stewardship is thus a comprehensive process which brings together, to positive effect, many different aspects of a product's health safety and environmental management, responding to both regulatory requirements and societal pressures.

81. The integration of the management principles set out below, constitutes the process of product stewardship.

(i) Maintain a commitment through policy, management leadership, communication and resources to continuous improvement in the product stewardship process.

(ii) Develop products that respond to public needs, while minimizing health and safety risk and adverse environmental impacts.

(iii) Maintain a knowledge base to enable assessment as an ongoing process of the potential adverse effects of products and their uses.

(iv) Identify reasonably foreseeable uses and misuses of products and evaluate risk levels during new product development; periodically update the evaluation for existing products.

(v) Develop and implement management controls, including emergency plans, appropriate to the risk level, to enable the proper handling, use and disposal of products.

(vi) Ensure that changes in product specification and quality do not adversely affect safety, health or the environment.

(vii) Evaluate and do business with suppliers, contract manufacturers, distributors and customers who meet applicable Safety, Health and Environment (SHE) criteria relevant to the products sold.

(viii) Provide contract manufacturers, distributors and customers with information and guidance to enable the proper development, manufacture, distribution, marketing, use and disposal of products.

(ix) Educate and update, as needed, relevant personnel so that they are in a position to advise customers and distributors on the responsible use and disposal of products. Seek feedback on customer use and misuse of products.

(x) Develop and continuously improve programs that lead to improved manufacturing efficiency and, where appropriate, recovery, recycling and disposal of products.

82. Product stewardship programmes are consistent with the philosophy and principles of Responsible Care, but are not a formal part of the initiative in some associations.

ECONOMIC AND TRADE ASPECTS

The Issue

83. There are two economic and trade issues of special importance in the management of toxic chemicals. One has to do with the high cost of the testing and assessment of chemicals. The other is that control measures and regulatory provisions can be obstacles to trade.

84. The most expensive element in the testing and assessment of chemicals is animal testing. Under Good Laboratory Practice (GLP) and quality assurance procedures, tests of chemicals for multiple toxicology endpoints require large

resources and much time (up to 64 months). In 1985 the estimated cost of a prechronic study was US$ 575,000 and of a chronic toxicity and carcinogenicity study US$ 1,300,000. The cost for long-term inhalation studies is even higher. The mutual acceptance of data by the many assessment and regulatory agencies in the world would have great economic benefit. However, a prerequisite for mutual acceptance of data is the harmonization of test methods.

85. If countries establish different rules for allowing chemicals to be on the market this can create undue obstacles to trade.

86. A further step which would bring considerable economic benefits is the mutual recognition of principles for the acceptance of a certain chemical on the market.

Current Activities

87. Recent activities in OECD have resulted in guidelines for testing of chemicals, accepted principles for good laboratory practice, and an OECD Council Decision on the mutual acceptance of data. It could be of great economic importance if a similar system could be operative world-wide.

88. Within GATT a Standards Code has been negotiated to ensure that when governments adopt technical regulations or standards, for reasons of safety, health, consumer or environmental protection, or other purposes, such regulations and standards, and the testing and certification schemes related to them, do not create unnecessary obstacles to trade. The Standards Code provides for notification of regulations and standards to the GATT and the opportunity for other GATT Parties to comment on the actions, including their possible impact on trade. Although there have been a number of such notification and consultations, there has not been a final formal resolution of any dispute under the Standards Code procedures.

ACCIDENT PREVENTION AND EMERGENCY RESPONSE PROCEDURES

The Issue

89. Technological accidents occur each year in all parts of the world, leading to loss of lives and property and damaging the environment, sometimes well beyond the factory boundary. They occur not only during manufacturing but during the transport, storage and disposal of dangerous materials. Incidents leading to the contamination of food, drinking water, medicines and consumer goods, as well as explosive releases to the atmosphere. Toxic substances of animal and plant origin (including microbiological) may be involved, as well as manufactured chemicals. Accident prevention and emergency response procedures are necessary not only to protect health, the environment but also to protect production capabilities and thus to sustain development.

90. Many processes in the chemical and energy industries are autoanalytic and a loss of control has the potential to become self-aggravating. Analysis of past accidents shows that what may initially appear to be a relatively trivial event, the malfunctioning of one of the many valves on a pump or a defect in instrumentation, can swiftly develop into an explosive situation.

91. Action is needed, firstly to reduce the probability of occurrence of accidents and their potential impact, secondly to ensure a prompt and adequate response is a decisive factor in coping with such accidents. It is also obvious that the public wants to know what the risks in its neighbourhood are and what are the likely consequences of a major accident involving chemical substances in the nearby industrial installation or on the adjacent highway.

92. The following detailed factors have been identified as leading to accidents:

- development and use of dangerous processes;
- lack of assessment of the hazards and of potential dangers both at plant level (safety audits) and at community level;
- lack of knowledge, information and training among industry personnel, increasing the weight of the "human factors";
- lack of preventive maintenance;
- lack of preparedness at the plant level and at the local community level;
- lack of co-ordination between the various actors involved;
- lack of test drills of the emergency response plans: the emergency plan is only stored on a shelf and not seen as a tool;
- lack of information to the public;
- lack of systems for rapid detection of an accident (or imminent threat) and for immediate response;
- decrease in sensitivity of the decision-makers, both in government and industry, as no major accidents are reported.

93. Many governments, but mainly in the developed countries, have now set up legal and operational frameworks aimed at both prevention and emergency response. In industry, many companies are reviewing and strengthening the safety programmes in their plants and closely monitoring them. They are providing information to the public on the potential hazards of chemicals and installations.

Current Activities

94. ILO has prepared a manual on major hazard control and is now preparing a code of practice on the prevention of major industrial accidents and preparing a convention on safety in the use of chemicals. It runs technical co-operative projects in a number of developing countries. IPCS works to ensure the preparedness of health authorities and personnel to respond to accidents, in the issue of safety cards, and in the development of poison information centres. More specialized agencies encourage accident prevention and response preparedness within their fields.

95. In 1991, the United Nations launched the International Decade for Natural Disasters Prevention, with activities which are often relevant to technological disasters. UNEP's, Awareness and Preparedness for Emergencies at Local Level (APELL) programme is designed to assist decision-makers and technical personnel to improve community awareness of hazardous installations and to prepare response plans. The APELL programme involves publication of technical documents, training and the support of demonstration activities. IRPTC provides a global information network and central database on hazardous chemicals. UNEP, WHO, UNIDO, and IAEA are also involved in an inter-agency project on risk assessment of energy and other complex industrial systems. At the regional level, the ECE is preparing a convention on the Transboundary Impacts of Industrial Accidents.

96. OECD has created an ad hoc group of experts on accidents involving hazardous substances. It is publishing users' guides to hazardous substance databanks and to information systems useful to emergency planners and responders. It is preparing comprehensive Guiding Principles on Accident Prevention, Preparedness and Response, which include guidance to international assistance programmes in taking decisions on funding and technical assistance to developing countries. UNEP and OECD are also jointly compiling an International Directory of Emergency Response Centres.

EDUCATION, TRAINING AND PUBLIC AWARENESS, INCLUDING RISK COMMUNICATION

The Issue

97. Everyone in the world and the whole natural environment are affected directly and indirectly by chemicals. If the risks of chemical production, use and disposal are to be controlled while ensuring that the many benefits are maintained, it is essential that people should be educated to understand why there may be problems and the often simple means by which they may be avoided or solved. The goal must be to ensure that everyone from the school child to the most influential politician or industrialist gets information on toxicology, especially relating to environmental health and chemical safety, at a level appropriate to their needs, and that they have enough understanding to make effective use of this information. This goal can be achieved only if there are sufficient trained professionals in environmental health to assess and interpret the available information and translate it into terms

comprehensible by the general public. At present very few education programmes cover the health and environmental risks associated with chemicals.

98. Few health professionals have had the specialized training on hazardous substances including in prevention, diagnosis and treatment of poisonings or the response to major accidents.

99. Media coverage of incidents involving hazardous substances could be improved. Reporters often have difficulty in obtaining background information and lack the understanding of toxicity necessary to evaluate the incidents and interpret them for the public. False risk perceptions could cause panic responses and ill-judged actions at all levels.

100. Even those working with potentially hazardous chemicals in industry often have inadequate training in safe work practices, leading to inappropriate practice in the use, storage, transport, disposal of chemicals and clean-up of spillages. Industrial decision-makers could be better informed for improving the effectiveness of risk management.

101. If governments are to establish balanced and effective policies and regulations of hazardous substances, their awareness of the fundamentals of toxicology and the potential for adverse health effects of exposure to chemicals need to be increased. Policies must take account of the public perception of risk, which, in turn, depend upon the effectiveness of the risk communication process from government and the media. The goal of risk communication is to produce an informed public that is involved, interested, thoughtful, solution- oriented and collaborative. Account must be taken of the influence of social and cultural background and of the many groups each with different interests. People are often more concerned about trust, credibility, competence, control, fairness, caring and compassion than about statistics and quantitative risk assessment. Trust and credibility are the most important assets of the communicator and once lost are almost impossible to regain.

102. All the above comments refer equally to developed and developing countries but, in general, the shortage of highly trained personnel, particularly of educators, in the developing countries makes matters more difficult. Clearly the first requirement of any programme of education and increasing public awareness must be the production of appropriate accurate information and sufficient teachers and trainers to ensure that it is put to good use.

Current Activities

103. The improvement of education, training and public awareness on chemical safety has always been an ongoing major activity of IPCS.

104. Its work on manpower development has been in two main parts, one the production of publications containing evaluated information and aimed at specific groups concerned with chemical safety and the other through the establishment of various levels of training and education.

105. Many of the publications produced by IPCS have an educational, training and awareness component. The Environmental Health Criteria documents (EHCs) are designed for scientific experts responsible for the evaluation of risk posed by chemicals to human health and the environment. The Health and Safety Guides (HSGs) summarize the essential points of the EHCs for administrators, managers and decision-makers generally. The International Chemical Safety Cards (ICSCs) summarize the essential information further for the benefit of workers. The Poisons Information Monographs (PIMs) give medical advice on prevention and treatment of poisoning. In collaboration with FAO, IPCS produces monographs on safety assessment of chemicals in food (additives, contaminants, pesticide residues, veterinary drug residues) and data sheets on pesticides that are also useful sources of information.

106. Training and educational activities for professional staff concerned with toxicology are set at various levels, according to the personnel involved, from seminars or workshops on selected topics and intensive short courses on experimental toxicology to full academic training in toxicology.

107. FAO, ILO, UNIDO, UNEP and the World Bank also have training programmes; UNDP funds many training activities carried out by the other agencies. FAO runs many regional and national courses on the safe and efficient use of chemicals in agriculture including training on the implementation of the International Code of Conduct on the Distribution and Use of Pesticides. FAO frequently collaborates with WHO and other United Nations agencies in its training activities which are particularly directed to strengthening the infrastructure needed for pesticide registration and post-registration use activities. ILO has a major safety training programme, diverted towards chemical safety in the workplace, on a regional and national basis including the preparation and publication of training materials and audiovisual aids. UNIDO organizes training as part of its industrial development work, particularly in the field of pesticides.

108. The Industry and Environment Office (IEO) of UNEP has training programmes on hazardous waste management and on awareness-raising and training as part of its APELL (Awareness and Preparedness for Emergencies at Local Level) process. IEO also publishes promotional material and operates a query response service.

109. UNEP'S IRPT+C project for National Registers of Potentially Toxic Chemicals provides training to national participants in the use of its computerized data files in the establishment of national registers. IRPTC also publishes a regular Bulletin, NRPTC Newsletter, collections of lectures and other training materials.

STRENGTHENING OF NATIONAL CAPABILITIES FOR MANAGEMENT OF CHEMICALS

A Common need

110. Damage to the natural environment, excessive exposures to chemicals, accidents involving chemicals an degraded conditions in human settlements, at

least in part associated with present practice to do with harmful chemicals, are widely reported from around the world. Most countries acknowledge a need to strengthen their capabilities for the environmentally sound management of chemicals.

The Task

111. Chemical risk management comprises the actions required to:

- contain processes;
- contain hazardous substances and products during extraction (especially mining), production, distribution (especially packaging and transport), storage and disposal;
- minimize and then contain hazardous wastes;
- minimize and then optimize point-source discharges of chemicals from industry, power generation, incineration, motor vehicles etc.;
- control and if necessary restrict or ban the importation and manufacture, or specified uses of particular hazardous substances and products so as to limit human exposure and environmental contamination;
- prevent chemical accidents, contain their effects if they occur, and rehabilitate the site and any victims of the accident;
- prevent poisoning by chemicals, undertake toxicovigilance and manage poisoned people;
- limit to acceptable levels the concentration of hazardous chemicals in food, drinking water, consumer products and environmental degradation due to past misuse of chemicals and restore to health victims of such degradation.

The Principles

112. Chemical safety policy needs to be based on the best available scientific information and every reasonable effort has to be made to improve the information base. For cost sharing reasons risk assessment could to the greatest extent possible be performed internationally.

113. Because of the limitations of knowledge, a precautionary approach needs to be adopted. Chemicals must be used prudently; with a presumption in favour of reliable containment of potential hazards; contamination must be minimized within stringent but reasonable limits. The test must always be a rational analysis of the possibility of harm, taking into account both what is known and what is not known. At the same time, costs and benefits as well as risks,

need to be assessed. The benefits of the hazardous technology or substance need to be recognized. The hazards and risks associated with alternatives must be assessed, with allowance for the fact that the drawbacks of a new technology may take time to emerge.

114. Prevention is preferable to clean-up, and whenever possible, pollution should be controlled at the source. Clean-up of contaminated land, advanced treatment to remove contaminants from drinking water, etc., should have their main application in dealing with the residues of historical bad practice. Where there is a strong economic and social case for the uncontained use of hazardous chemicals, as in some agricultural applications, all that is practicable must be done to restrict the costs of remedial action further down the pathway. Regulation by standard setting needs to go hand in hand with agreement on the safest and most cost-effective control measures, or it may lead to sub-optimal action by those on whom the regulations directly bear.

115. Priorities have to be set. The use of chemicals, or products which may release them is widely diffused throughout modern society. The points at which releases into the environment can take place and at which unwanted exposures may occur are many. The key to successful management is to determine which processes, substances, products and uses are significantly hazardous and to concentrate action on these in a rational order. Not everything worth doing is a priority; a rigorous selection is needed for best effect. Priorities may change rapidly because of new hazards, new information from hazard identification programmes and new technical solutions. Moreover, the last stage of a complete risk reduction programme on a particular chemical is likely to provide little benefit at large cost so that the question of how to obtain the greatest return from the resources available should be kept under review.

116. Chemical risk management should be well integrated. It is total exposure that matters, regardless of source or pathway. For optimal efficiency, policy must consider all significant sources and pathways and the full life-cycle of a chemical, "from cradle to grave". In particular, the control of all industrial waste streams has to be integrated so that protection of one part of the environment is not bought at the expense of another.

117. Chemical safety demands a sound infrastructure. Complex modern technologies, which have chemical hazards associated, cannot be made safe just by the appropriate scientific information and by regulation. Correct use and maintenance under sound management are essential for safety. If a high degree of safety is to be assured, the choice of technology will be shaped by the adequacy of the infrastructure in place, both for operation of the technology and for all aspects of risk management. In particular, modern systems may demand widespread computer literacy, in high degree.

118. Chemical safety information must be available to all. The substantial gaps which exist in information on the hazards of substances, technologies and systems, and on effective ways of controlling them, are compounded by the fragmentation of risk management at all levels (including the international level) and by a failure to share information to the extent which is practicable. Effective risk management is also handicapped by the great

differences in risk perception which exist amongst members of the public and the scientific knowledge and locally relevant data on chemicals and related matters, in an accessible form, to workers and the public at large.

119. The responsibility for chemical safety is shared by all. The main responsibility lies on industry, which should exercise "Responsible Care". A fundamental responsibility lies on government to devise sound policies and establish a sound institutional framework. But a responsibility falls on every citizen. Potential chemical hazards are widely distributed throughout society, at home, the workplace, and out of doors, in both traditional and modern societies. It is not possible to devise and enforce regulations to cover more than the most important of the hazards. Regulation has the drawback of rigidity in the face of locally-variable problems and of discouraging initiative in pursuit of safety, as well as of economic efficiency. Enforcement of even a modest regulatory regime is likely to be ineffective without the understanding and consent of the majority of those concerned in the community. What is required is the creation of a safety culture in which everyone understands the risks implicit for themselves and others in what they do and the materials they use, and in which care to protect the environment and the health of all is seen as a natural and unforced part of social responsibility.

The Means

120. A government intent on strengthening the natural capacity for the management of chemicals could review the scope and effectiveness of arrangements of:

- legislation,
- information provision,
- risk assessment,
- policy development,
- oversight and enforcement of regulations.

121. In the development of policy, particular attention needs to be given to cross-sector collaboration.

122. A sound infrastructure, including for education, training and research are essential.

123. Above all means have to be found to inform, motivate and enthuse people at every level of industry, agriculture and commerce, since it is only with their active participation that success can be achieved.

International Cooperation

124. International organizations could cooperate and assist countries in strengthening national capabilities for environmentally sound management of chemicals. This report elaborates some of the existing programmes and proposals for action options are set out by the Secretary General of UNCED in document A/CONF.151/PC/I.